PENNWALT
CORPORATION

INSTALLATION, OPERATION & MAINTENANCE
INSTRUCTIONS

PORTABLE PNEUMATIC CALIBRATOR

SERIES 65-120

WALLACE & TIERNAN
DIVISION
25 MAIN STREET, BELLEVILLE, NEW JERSEY 07109

BOOK NO. WAA 650.120

I-78

EQUIPMENT SERIAL NO. _____

DATE OF START-UP _____

START-UP BY _____

GUARANTEE AND WARRANTY

Seller warrants for a period of one year after shipment that the apparatus of its manufacture is free from defects in workmanship and materials but its liability is limited to the replacement f.o.b. Belleville, N. J., of the defective parts thereof. Corrosion or other decomposition by chemical action is specifically excluded as a defect covered hereunder, except that this exclusion shall not apply to chlorination equipment. Where circumstances permit, Seller will invoke, for the benefit of Purchaser, the guarantee or warranty of Seller's vendor for equipment or material furnished hereunder. In the event the apparatus or equipment furnished hereunder shall be used in any capacity in connection with any nuclear facility, Buyer agrees to hold Seller harmless from all claims for damages arising out of injury to or destruction of the nuclear facility, or property thereat. Seller shall not be liable for any direct or consequential damages arising from the sale or use of the apparatus or equipment other than as expressly provided herein.

ordering information

In order for us to fill your order immediately and correctly, please order material by description and part number, as shown in this book. Also, please specify the serial number of the equipment on which the parts will be installed.

Statements and instructions set forth herein are based upon the best information and practices known to Wallace & Tiernan Division, PENNWALT Corporation but it should not be assumed that every acceptable safety procedure is contained herein. Of necessity this company cannot guarantee that actions in accordance with such statements and instructions will result in the complete elimination of hazards and it assumes no liability for accidents that may occur.

Information of particular importance to the equipment operator is highlighted by the use of the words "NOTE", "CAUTION" & "WARNING", each having the particular significance listed below:

NOTE:	Information of particular importance related to equipment operation.

CAUTION:	Lack of observance of this information will result in equipment malfunction or damage.

WARNING:	LACK OF OBSERVANCE OF THIS INFORMATION CAN RESULT IN A HAZARD TO PERSONNEL & EQUIPMENT.

THE ENTIRE CONTENTS OF THIS INSTRUCTION BOOK SHOULD BE THOROUGHLY REVIEWED PRIOR TO INSTALLING AND OPERATING THE EQUIPMENT.

NOTE:

DO NOT DISCARD THIS INSTRUCTION BOOK UPON COMPLETION OF INSTALLATION. INFORMATION PROVIDED IS ESSENTIAL TO PROPER AND SAFE OPERATION AND MAINTENANCE.

NOTE:

ADDITIONAL OR REPLACEMENT COPIES OF THIS INSTRUCTION BOOK ARE AVAILABLE FROM:

WALLACE & TIERNAN DIVISION, PENNWALT CORPORATION
25 MAIN STREET, BELLEVILLE, NEW JERSEY 07109

IN AN EFFORT TO MAKE PRODUCT IMPROVEMENTS AVAILABLE TO W&T CUSTOMERS AS QUICKLY AS POSSIBLE, PROGRESSIVE CHANGES IN DESIGN MAY BE INCORPORATED INTO W&T PRODUCTS FROM TIME TO TIME THAT ARE NOT IMMEDIATELY REFLECTED IN THE INSTRUCTION BOOK. IF SUCH A CHANGE APPARENTLY HAS BEEN MADE IN YOUR EQUIPMENT AND DOES NOT APPEAR TO BE REFLECTED IN YOUR INSTRUCTION BOOK, CONTACT YOUR LOCAL W&T SALES OFFICE FOR INFORMATION.

PLEASE NOTE THAT EQUIPMENT SERIAL NUMBER IS ESSENTIAL FOR EFFECTIVE COMMUNICATION AND PROPER EQUIPMENT IDENTIFICATION.

WARNING:	TO ENSURE PROPER AND SAFE OPERATION OF THIS EQUIPMENT, USE ONLY W&T LISTED PARTS (EXCEPT COMMERCIALLY AVAILABLE PARTS AS IDENTIFIED ON PARTS LISTS). THE USE OF UNAPPROVED PARTS CAN RESULT IN EQUIPMENT MALFUNCTIONS HAVING HAZARDOUS CONSEQUENCES.

REGIONAL OFFICES

INSTALLATION, OPERATION, MAINTENANCE AND SERVICE INFORMATION

Direct any questions concerning this equipment which are not answered in the instruction book to the Reseller from whom the equipment was purchased. If the equipment was purchased directly from Wallace & Tiernan Division, PENNWALT Corporation, contact the nearest office indicated below.

UNITED STATES

ATLANTA
Suite 350
1800 Century Blvd., N.E.
Atlanta, GA 30345
~~(404) 634-5164~~

BOSTON
P. O. Box 6
Walpole, MA 02081
(617) 762-1620

CHICAGO
2540 South 27th Ave.
Broadview, IL 60153
(312) 626-8593

CLIFTON
642 Broad Street
Clifton, NJ 07013
(201) 472-7300

DALLAS
Suite 500
2949 Stemmons Freeway (I-35E)
Dallas, TX 75247
(214) 631-3680

KANSAS CITY
P. O. Box 875
Shawnee Mission, KS 66201
(913) 384-3933

LOS ANGELES
P. O. Box 1858
West Covina, CA 91793
(213) 962-2472

PHILADELPHIA
P. O. Box 385
Wayne, PA 19087
(215) 687-4240

PITTSBURGH
98 Vanadium Road
Bridgeville, PA 15017
(412) 563-2800

SAN FRANCISCO
Suite 210
881 Sneath Lane
San Bruno, CA 94066
(415) 871-1220

CANADA

If the equipment was purchased directly from Wallace & Tiernan Division, Pennwalt of Canada Limited, contact the nearest office indicated below.

ALBERTA
207 Fourteenth St., N.W.
Calgary, Alberta T2N 1Z6
(403) 283-0573

BRITISH COLUMBIA
470 Granville Street
Vancouver, British Columbia
(604) 682-4829

MANITOBA
104-1280 Archibald Street
Winnipeg, Manitoba R2J 0Z3
(204) 256-6004

NOVA SCOTIA
P. O. Box 3350
South Postal Station
Halifax, Nova Scotia B3J 3J1
(902) 423-1522

ONTARIO
925 Warden Ave.
Scarborough, Ontario M1L 4C5
(416) 751-7561

QUEBEC
Room 207
4280 Blvd. Metropolitan East
Montreal, Quebec H1S 1A2
(514) 729-2856

PORTABLE PNEUMATIC CALIBRATOR

DESCRIPTION

This instruction book provides installation, operation and maintenance instructions for the Wallace & Tiernan Series 65-120 Portable Pneumatic Calibrator. This equipment is designed primarily for field checking and calibration of pneumatic controls and instrumentation. In most cases the gauge, recorder or other pneumatic device being checked need not be removed from its mounting or operating location.

The Series 65-120 Calibrator consists of a carrying case containing an aluminum panel on which are mounted a precision pressure gauge, a selector valve, two precision pressure regulators, an air filter, and a connection block. A graphic flow diagram on the panel shows clearly all connections between the various units.

1. Pressure Gauge

   The gauge has an accuracy of 1 part in 1000 of full scale range. The gauge has a dual scale with ranges from -100 inches of water to +850 inches of water and -3.6 psi to 30.6 psi. Other gauges with ranges to 100 psi are also available.

WARNING: MAXIMUM PRESSURE WHICH MAY SAFELY BE APPLIED TO THE CASE IS 35 PSIG.

2. Selector Valve

   The selector valve permits only one of any three pressures to be applied to the pressure connection in the gauge. A fourth position permits venting pressure from the gauge to atmosphere.

3. Air Filter

   The air filter mounted under the panel is easily replaceable and protects the various components if the air supply is of less than instrument air quality.

WARNING: DO NOT APPLY PRESSURE IN EXCESS OF 90 PSIG TO THE FILTER. WITH GAUGES WITH RANGES ABOVE 30 PSI, A FILTER WITH A 175 PSI RATING IS USED.

4. Precision Pressure Regulators

   The two precision pressure regulators accept supply air pressure thru the filter and regulate the output. These are used in applying known pressures to pneumatic control devices.

5. Accessories

   Furnished with the calibrator are six couplings U16052 for 1/8-inch pipe thread to 1/4-inch OD plastic tubing and 20 feet of 1/4-inch OD plastic tubing RP68-4441.

DESCRIPTION (Cont'd)

6. Case

The lid of the carrying case may be removed for convenience.

CARE OF INSTRUMENT

This calibrator is a precision instrument. It has been just as ruggedly constructed as the service for which it is intended will permit, and every precaution has been taken to prevent it getting out of adjustment when subjected to vibration and shock. In an instrument as sensitive as this, delicate parts must be used. In view of this, the instrument should be handled with care and protected against violent and sudden jolts.

This instrument mechanism does not require oil.

This instrument is intended for use with dry non-corrosive gas.

OPERATION OF INSTRUMENT

Exercising. When using an aneroid indicator for precise calibrating purposes, due consideration must be given to the effect of hysteresis. Before using this instrument, apply pressure to the full range, allow to remain two minutes and then release allowing the pointer to return to zero. This exercising procedure minimizes the hysteresis effect. Repeat twice. Note that the instrument is calibrated on increasing pressure.

Reading. There is a label on the panel which indicates whether the instrument should be read with the dial horizontal or vertical. However, because the machanism is carefully balanced, position error may be neglected except when very precise calibrating work is being done. This slight position error may be easily determined by reading the instrument in both positions and noting the difference. To eliminate parallax and read the instrument correctly, place the eye so that the pointer and its image coincide.

Calibrating Adjustment. Note that the accuracy tolerance is the same at all points on the scale. Therefore, the pointer of a gauge pressure instrument is not necessarily at an exact zero when the instrument is shipped from the factory. However, the deviation is never outside the guaranteed accuracy as shown in the table PERFORMANCE CAPABILITY.

A label affixed to the panel indicates the diviation from zero when the instrument was adjusted to attain optimum accuracy over the full scale. This figure was obtained after the instrument was exercised as described in first paragraph above: Exercising.

If, after the instrument has been exercised, the pointer deviation is as specified, no adjustment is necessary. A slight discrepancy may be corrected by adjusting the pointer as described below.

CALIBRATING ADJUSTMENT (Cont'd)

A complete check of calibration of an instrument requires that it be exercised as above and compared with a standard having a verified accuracy at least five times greater and a scale comparable in length to the instrument being checked. The standard must be corrected for all its inherent errors and must be corrected to standard conditions of gravity (980.665 cm/sec^2) and temperature (0°C for mercury columns or 20°C for water columns) where applicable.

While aneroid instruments are not subject to changes in reading due to gravity, they are affected by temperature. W&T instruments read directly in terms of standard conditions (see preceding paragraph) at the temperature 25°C unless otherwise indicated. If the calibration check is conducted at 25°C, the effect of temperature on the W&T instrument need not be considered. At any other temperature, the temperature effect listed in the table PERFORMANCE CAPABILITY must be considered. Note that this not a correction factor but, rather, a tolerance that must be added to other tolerance being checked. When readings are taken on increasing pressures, they should fall within the specified accuracy tolerance given in the table. The difference between the up-scale reading and the down-scale reading is the hysteresis error and should fall within the specified limits.

Setting the Pointer. If a calibration check shows the readings on increasing pressures at various points over the entire range are out by the same angular distance, the pointer may be reset. Adjustment is limited to a pointer movement of about 10 degrees.

Access to the pointer adjustment screw is obtained by removing a plug in the back of the case.

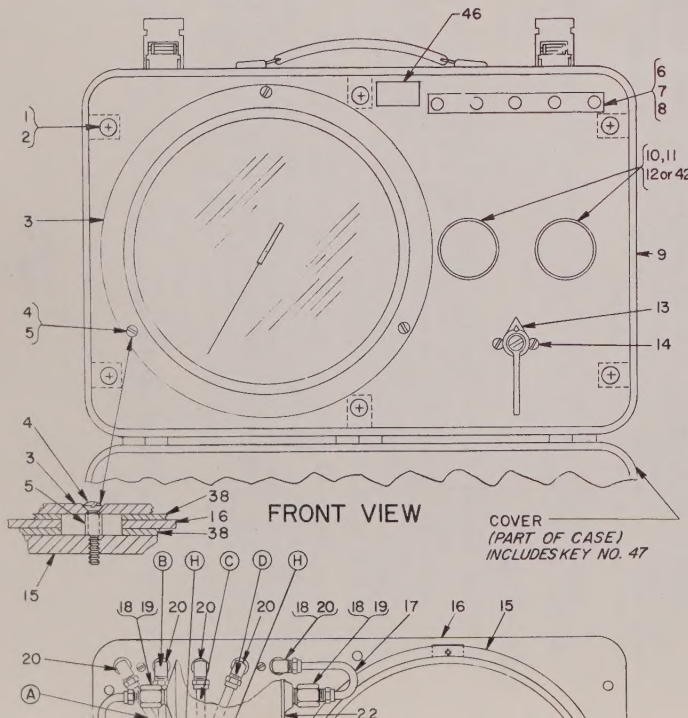
PRECAUTIONS

A. Do not subject the instrument to pressure beyond its range. This can easily be controlled by proper setting of the air regulator. A pressure relief valve (36, 37, or 43) has been installed to protect the mechanism in the event of an air regulator failure. These relief valves are set to relieve at approximately 15% above full scale and will protect the mechanism for overpressure up to three times full scale range.

B. Unless wide temperature changes are experienced, the effect of temperature may be neglected. Therefore, do not install the instrument near a source of heat or cold. Temperature allowance equals 0.1 percent of full scale per 10° Centigrade change from calibration temperature of 25°C. Temperature allowance represents the maximum possible error due to temperature. Because the actual error is usually much less, temperature allowance is not a correction factor.

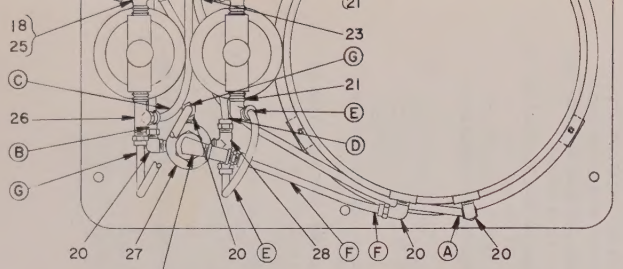
C. DO NOT use for liquid service.

SERIES 65-120 PORTABLE PNEUMATIC CALIBRATOR | PARTS

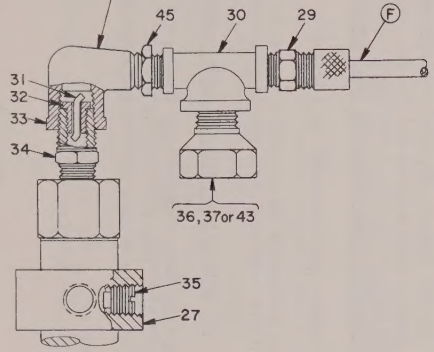


KEY NO.	PART NO.	QTY	DESCRIPTION	INSTRUMENT RANGE
1	P 43283	6	MACH. SCREW (TRUSS HD.,S.S.)1/4"-20X1/2"LG.	-5.6 P.S.I. TO +30.6 PSI / -100" H_2O TO + 850" H_2O / 0 TO 125" H_2O / 0 TO 100 P.S.I. MAX.
2	P 47331	6	SPEED NUT(TYPE "U") 1/4"-20	
3	-	1	GAUGE (NOT PART OF ASSEMBLY)	
4	PN 4417	3	MACH. SCREW(OVAL HD.,BRASS)#8-32 X 1" LG.	
5	P 47333	3	SPACER	
6	FP 9923	1	AIR CONNECTION MANIFOLD	
7	PN 6938	2	MACH.SCREW(RD.HD.,BRASS)#10-32X7/16"LG.	
8	P 13619	2	#10 LOCK WASHER (S.S.)	
9	FU 4876	1	CASE	
10	U 18713	2	AIR REGULATOR (0 TO 30 P.S.I.)	
11	UXA 18713	2	AIR REGULATOR (0 TO 5 P.S.I.)	
12	UXB 18713	2	AIR REGULATOR (0 TO 60 P.S.I.)	
13	P 47844	1	POINTER	
14	PN 3774	2	MACH.SCREW(FLAT HD.BRASS)#8-32X3/8"LG.	
15	FP 9924	1	BRACKET RING	
16	FP 9925	1	PANEL	
17	FP 9921	1	TUBE	
18	P 34440	6	PLASTIC GLAND	
▲19	U 18068	2	HALF UNION, 1/4"PIPE X 1/4" TUBE	
▲20	U 16053	9	90° ELBOW, 1/8" PIPE X 1/4" TUBE	
▲21	U 16049	2	90° ELBOW, 1/4" PIPE X 1/4" TUBE	
22	U 13422	1	AIR FILTER UNIT (0 TO 30 P.S.I.)	
23	FP 9920	1	TUBE	
24	FP 9922	1	TUBE	
▲25	U 16050	1	TEE, 1/4"TUBE X 1/4"TUBE X 1/4" PIPE	
▲26	U 16051	1	TEE, 1/4" TUBE X 1/4" PIPE X 1/4" TUBE	
27	U 20030	1	SHUT-OFF VALVE(4 WAY)	
▲28	U 16069	1	TEE, 1/4" TUBE X 1/4" TUBE X 1/8" PIPE	
▲29	U 16048	1	HALF UNION, 1/4"PIPE X 1/4" TUBE	
30	P 49289	1	TEE,1/4"PIPE X 1/4" PIPE X 1/4" PIPE	
31	RC68 2080	1/2"LG	#18 GAUGE COPPER WIRE	
32	PXA 38519	1	RESTRICTOR	
33	P 42329	1	1/8" STREET ELBOW	
34	P 47942	1	ADAPTER	
35	PN 7707	1	FILTER	

MODEL AND SERIAL NUMBER OF APPARATUS



REAR VIEW



ENLARGED VIEW

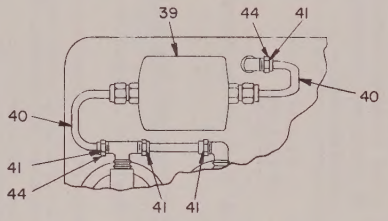
37	FU 4909	1	RELIEF VALVE			
38	RK44 5005	3	RUBBER CHANNEL - 9-1/2"LG.EACH			
39	FU 4969	1	AIR FILTER UNIT (GAUGE ABOVE 30 P.S.I.)			
● 40	FU 4970	2	TUBE			
● 41	P 47766	2	BRASS SLEEVE			
42	UXC 18713	1	AIR REGULATOR (0 TO 100 PSI)			
43	U 23056	1	RELIEF VALVE			
● 44	P 34439	2	1/4" COMPRESSION NUT			
45	P 686	1	REDUCING BUSHING, 1/4"PIPE X 1/8" PIPE			
46	FP 10046	1	SPECIAL INSTRUCTION LABEL			
47	L 1809	1	NOTE LABEL			

✱ REPLACES KEY NO. 23

▲ INCLUDES PLASTIC GLAND P 34440 & NUT P 34439

● PART OF U23884

FURNISHED NOT FURNISHED



REAR VIEW
(0 TO 100 PSI. MAX.)

1/4" O.D.PLASTIC TUBING RP68 4441	
KEY LETTER	LENGTH
A	17"
B	7"
C	8"
D	7"
E	8"
F	4"
G	8"
✱ H	2-1/8"

NOTE---
OVERALL DIMENSIONS, 18"x7"x12½"

WHEN ORDERING MATERIAL ALWAYS SPECIFY

PENNWALT
WALLACE & TIERNAN DIVISION
25 MAIN STREET, BELLEVILLE, NEW JERSEY 07109
ISSUE 10 DATE 7-77
650.120.00.011

PRECAUTIONS (Cont'd)

> WARNING: THE MAXIMUM PRESSURE WHICH MAY SAFELY BE APPLIED TO THE INSTRUMENT CASE IS 35 PSIG. ("S" CONNECTION) A RELIEF VALVE ON THE GAUGE CASE WILL PROTECT THE CASE FROM APPLIED PRESSURE UP TO 10 TIMES THE MAXIMUM CASE PRESSURE RATING. HOWEVER, THIS VALVE IS AN EMERGENCY-PROTECTIVE DEVICE ONLY. PRECAUTIONS MUST BE TAKEN NOT TO APPLY PRESSURE GREATER THAN THE MAXIMUM CASE PRESSURE.

OPERATION

The details of some typical uses of the Portable Pneumatic Calibrator are given below.

A. Measurement of Pressure from External Sources

1. Connect the unknown pressure to connection marked P3. Leave S open to atmosphere.
2. Turn selector valve to position P3 and read the pressure on calibrator.

> NOTE: For vacuum greater than 100 inches of water connect to S and leave P3 open to atmosphere.

B. Calibration of Pressure Gauges With Air

1. Connect AIR SUPPLY to a source of air pressure from zero to 100 psig.
2. Connect gauge to P1 or P2 with flexible tubing or, if gauge is small enough and has 1/8-inch NPT male thread, screw gauge directly into connection block at P1 or P2.
3. Turn handle of appropriate regulator counter-clockwise until spring in regulator is completely relaxed.
4. Turn handle of selector valve to appropriate position.
5. Turn on air supply, adjust pressure to desired value with regulator and compare gauge reading with calibrator reading.

C. Calibration of Pneumatic Recorders or Indicators

1. Connect air supply and recorder or indicator as in paragraph B1 and 2 above.
2. Proceed as in paragraph B3, 4 and 5 comparing recorder pen reading or indicator pointer reading with calibrator reading.

D. Measurement of Pressure Differentials from External Sources

1. Connect higher of two pressures to P3.
2. Turn selector valve handle to position P3.
3. Apply lower of two pressure to "S" and read difference in pressure on calibrator.

D. Measurement of Absolute Pressure (Cont'd)

4. If two or three unknown pressures are to be compared to a reference pressure, the reference pressure would be connected to S, unless it is possible that the reference pressure can be more than 1 psi greater than one of the other pressures.
5. Assuming that the reference pressure is lower than the unknown pressures, the unknowns are connected one at a time to P3.
6. Apply one unknown pressure to the calibrator.
7. Turn on or apply reference pressure to "S" and read the difference on the calibrator.

CAUTION: Decrease reference pressure to zero or shut it off before shutting off or disconnecting pressure connection on P3.

E. Calibration of Pneumatic Controller in Which Applied Set and Variable Pressures Result in an Output Pressure Which is a Function on the Other Two Pressures.

1. Connect AIR SUPPLY to a source of air pressure not exceeding 60 psig.
2. Connect P1 to SET pressure connection on control device.
3. Connect P2 to PROCESS VARIABLE pressure connection on control device.
4. Connect OUTPUT connection on control device to P3.
5. Turn regulator handles counter-clockwise until spring in regulator is completely relaxed.
6. Turn on air supply.
7. Turn selector valve to position P1 and adjust Regulator 1 until SET pressure read on calibrator is value required by the particular device.
8. Turn selector valve to position P2 and using Regulator 2 set the PROCESS VARIABLE at some value near one end of the variable pressure range.
9. Turn selector valve to P3 and read the OUTPUT pressure resulting from action of P1 and P2 on controller.
10. Repeat Steps 8 and 9, as many times as desired to cover the range of PROCESS VARIABLE pressure.

F. Adjustment of Any Pneumatic Device in Which the Difference Between Two Signals Should Be Zero or Some Value Not Exceeding the Range of the Calibrator.

1. Connect the two signals to P3 and S respectively with the higher pressure on P3.
2. Turn selector valve to P3.
3. Turn on the two signals simultaneously if possible. Otherwise turn on P3 first.

WARNING: THE SIGNAL APPLIED TO S MUST NOT EXCEED 35 PSI.

G. Measurement of Absolute Pressure

1. Connect vacuum pump to S and evacuate case. The gauge pointer will indicate pressure below atmosphere (vacuum) when the case has been evacuated.

G. Measurement of Absolute Pressure (Cont'd)

2. Connect pressure to be measured to P3.
3. Turn selector valve to P3 and read absolute pressure.

> NOTE: Additional absolute pressures may be measured at P1 and P2 if the regulators are by-passed with the tubing furnished.

H. Calibrating of Vacuum Gauges

1. Set selector valve to P3 and leave connection P3 open to atmosphere.
2. Install a tee in S connection and connect one leg to a vacuum source and the other to the gauges which are to be calibrated.
3. Install a shut-off valve at vacuum source. Tee into the line between this shut-off valve and the calibrator with a bleed valve.
4. Compare calibrator readings with the vacuum gauge readings.

SERVICE NOTES

PRECISION PRESSURE REGULATOR

The regulator is a Model H-10-T purchased as a unit from Conoflow Corp., Blackwood, N.J. Wallace & Tiernan does not stock parts for this regulator and if any are needed, the manufacturer should be consulted. Be sure to specify the range as stamped on the bottom of the regulator.

Air Filter

Replace Koby air filter U13422 at regular intervals depending on the quality of the air supply and the frequency with which the calibrator is used. See label L1809 on Dwg. 650.120.150.010 for recommendations.

PRECISION PRESSURE GAUGE

Filter: Each instrument is furnished with a filter screwed into the pressure connections. The filter screen may occasionally require cleaning. This may be done as follows:

1. Unscrew the filter plug by means of a screwdriver.

2. Clean the filter with trichloroethylene or other suitable solvent and moisten with oil. Remove excess oil and replace the filter.

> WARNING: DO NOT USE OIL IF THE GAUGE IS USED WITH OXYGEN OR OTHER FLUIDS WHICH MAY REACT WITH OIL.

3. If the case orifice is plugged, remove the gauge mechanism from the case and clear orifice with a small diameter wire after unsoldering tubing from case connection.

PRECISION PRESSURE GAUGE (Cont'd)

Lubrication: The mechanism does not require oil. The oil will interfere with proper functioning and introduce serious errors. DO NOT OIL THE MECHANISM.

PERFORMANCE CAPABILITY

SERIES	ACCURACY (1)	SENSITIVITY (1)	HYSTERESIS (1)	MAX. TEMP. EFFECT (2)
1500	0.066	0.01	0.1	0.1
1000	0.1	0.01	0.1	0.1
300	0.33	0.2	___	___

NOTES:

(1) %Full Scale. Full Scale is the difference between minimum and maximum dial reading. Full Scale of an instrument with a calibrated range of 0 to 800mm Hg is 800 mm Hg where as Full Scale of an instrument with a calibrated range of 390 to 800 mm is 410 mm Hg.

(2) %Full Scale per $10^{o}C$ from $25^{o}C$.

NOTE

TO PROTECT YOUR PRECISION GAUGE,
ROUTINE FILTER CHANGE IS NECESSARY.
DAILY USE — EVERY MONTH
FREQUENT USE — EVERY THREE MONTHS
OCCASIONAL USE — EVERY YEAR

Last Filter Change

CHANGE FILTER IMMEDIATELY IF ANY LIQUID HAS BEEN ACCIDENTALLY INTRODUCED WITH INLET GAS! L-1809

THE AIR SUPPLY PRESSURE SHOULD BE LIMITED TO THE 90 PSI RATING OF THIS FILTER

L-1809

INSTRUMENT CALIBRATED
AT 25°C
FOR GAS SERVICE AND
MOUNTED HORIZONTALLY
DO NOT USE LIQUID
FP-10046

FP-10046

MP MASTER
MA22017